# Location Decisions and Network Configurations of Foreign Investment in Urban China[1]

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This article studies location decisions and network configurations of FDI in Nanjing, the capital of Jiangsu Province, located in the northwest of the Yangtze River Delta (YRD). Built upon the perspective that China's economic transition can be conceptualized as a triple process of globalization, marketization, and decentralization, this article outlines four structural changes of the Chinese economy, which are underlying the location and networks of FDI: decentralization and the empowerment of local states, marketization and the increasing importance of places, globalization and the emergence of globalizing city regions, and urban spatial restructuring. The study has uncovered substantial intraurban differentials existing within Nanjing and the significance of the Chinese state, location within the YRD, and intraurban context in the location decisions of FDI. We have also found that foreign ventures overwhelmingly serve as production facilities for either the Chinese or world market, and maintain close production relations with other foreign firms in the YRD. Lastly, regression models have identified the significance of national-level development zones, access to ports,

[1] We would like to acknowledge the funding of the U.S. National Science Foundation (BCS-0552264) and the Outstanding Young Scientist Award of the Natural Science Foundation of China (40428003).

and industrial land in the location of foreign ventures. **Key Words: foreign direct investment, location decision, production network, nation-state, China.**

Despite concerns for dualism, labor problems, and environmental degradation (e.g., Hardy 1998; Phelps and Tewdwr-Jones 2001), developing countries increasingly regard foreign direct investment (FDI) as an essential force in promoting economic growth and coping with global competition (Moran 2002; UNCTD 2004). Decentralization has enabled local states to intensify place promotion to influence location and network decisions of transnational corporations (TNCs). Varied forms of FDI or development zones such as export-processing zones, duty-free districts, and high-tech parks have been created to attract FDI and capitalize on globalization. The proliferation of local policies and development zones provides TNCs more choices in decision making, and also intensifies spatial competition for FDI. Substantial differentials also exist within cities, where old and emerging centers (often foreign investment zones) compete for preferential policies and FDI (Grant and Nijman 2002). Spatial selectivity of FDI is underlying intensified uneven development and spatial restructuring. Research on FDI, however, has paid little attention to the uneven structure of FDI within cities and the roles of local institutions and context in location decisions and network configurations (Wei and Leung 2005).

FDI has become a major force underlying the rise of China and the transformation of Chinese cities and regions (Wei 2000). China is the largest recipient of FDI in the world, and in 2006, its FDI reached US$74.8 billion. FDI in China, however, is also unevenly distributed; the coastal region, although having more expensive land and labor resources, dominates FDI,

often accounting for 85-90 percent of the total, especially the three emerging global city regions of the Yangtze River Delta (YRD), the Pearl River Delta, and the Beijing-Tianjin Region. Early research on FDI in China focuses on the Pearl River Delta, which spearheaded the open door policy, known as "one step ahead in China." With a shifting policy focus, the YRD has become a new center of FDI and globalization. The existing research, however, focuses on the globalization of Shanghai (e.g., Yusuf and Wu 2002), paying little attention to intraurban dimensions of FDI, as well as other cities in the YRD except for Suzhou.

This article studies FDI in Nanjing City, an ancient capital and one of the largest cities in China, with a population of 5.13 million in 2005 (5.96 million in Nanjing Municipality) (NSB 2006). Located in the northwestern fringe of the YRD and serving as the capital of Jiangsu Province, the city enjoys institutional advantages in policy and infrastructure. We have compiled detailed district-level information on foreign firms (often called foreign invested enterprises or FIEs) in Nanjing, which allows us to investigate intraurban characteristics and determinants of FDI. We have also gathered data from interviews of 20 FIEs and a dozen local government officials. These data, other secondary data (official statistics, firm reports, government documents et al.), and our years of experience with Nanjing provide valuable resources for our study. We highlight substantial intraurban differentials existing within Chinese cities, and investigate the effects of state institutions and site characteristics on the location decisions and network configurations of FDI.

## Research Background

Neoclassical work on FDI focuses on locational factors in determining FDI and adopts macro, quantitative approaches. Major locational factors identified include labor cost, market size, union membership, and transportation conditions (e.g., Glickman and Woodward 1988; Friedman, Daniel and Jonathan 1992; Hill and Munday 1992; Taylor 1993; Qu and Green 1997; Urata and Kawai 2000), although some efforts have been made to quantify non-traditional factors such as state policy (e.g., using tax rate). On the other hand, institutional economic geographers have uncovered the significance of nation states and networks in firm location and business organization, often based on case studies and qualitative approaches, including in China (e.g., Leung 1996; Hsing 1998; Sit and Liu 2000; Qiu 2005; Yang 2007). These perspectives are actually complementary, and integration with mixed methods is needed, since mixed-method approaches assist in overcoming the quantitative-qualitative divide and bridging different perspectives (Yeung 2003; Dunning et al. 2008).

China has experienced three fundamental changes since the late 1970s: the decentralization of power to local states, the transition from a command economy to a market-oriented economy, and the transformation from a closed economy to an open economy, which has been conceptualized as a triple process of decentralization, marketization, and globalization (Wei 2000) and is underlying economic restructuring and spatial agglomeration in China (Wei 2007; He, Wei, and Xie 2008). Under such a broad transformation, we here summarize four structural changes significantly affecting FDI location and network formation, which also provides a conceptual framework for this research. First, decentralization has granted local governments more authority and responsibility in providing incentives to attract foreign investment and develop local

economies. The significance of the state and policy incentives in the location of FDI is supported in the literature (e.g., Globerman and Shapiro 1999; Wei et al. 2008), although others downplay the effects of investment incentives (e.g. Loree and Guisinger 1995) and even are skeptical of their merits for the opportunity cost (see Hill and Athukorala 1998 for a review of the debate). Some literatures also indicate that differences in regional institutional capacities play an important role in the development of MNE-owned affiliates and their embeddedness (Cooke, Price, and Morgan 1995), while others argue that the effects of institutional initiatives on the embedding process are limited (Phelps, Stone, and Braidford 2003). In China, government policies towards FDI are location specific and vary across cities. They are grounded in specific sites and packaged for varied forms of FDI or development zones, such as export-processing zones, duty-free districts, high-tech parks, and economic-technological development zones (ETDZs). This form of state strategy is one of the most common practices of Asian development states. The state can also influence local networks of TNCs through policy intervention and bargaining with TNCs (Sit and Liu 2000; Yeung and Li 2000). The capacity of the Chinese state lies in state control over land, development process, tax, tariff/customs, quotas of import and export, and state subsidies, and its influence over bank loans, the labor force, and other resource allocation processes.

Second, marketization has intensified local efforts to fully exploit and use local advantages to attract FDI. The Chinese economy has been gradually exposed to market forces, which, as well as the open door policy, have further opened China to global competition. The competition for preferential policies has intensified because of the transitional nature of the Chinese state and its spatially uneven reform policies produced through the bargaining

between the central and local governments. To obtain preferential policies and gain policy approval from the central government, localities must articulate their local resources and advantages, i.e., rationales to make reform policies successful. This is an essential component of the bargaining process of China's reforms (Howell 1993). Localities also have to sell their local places to potential foreign investors, especially preferential policies and locational advantages. Marketization and decentralization have made conventional locational factors such as accessibility, natural resources, and infrastructure more important in the competition for FDI. Government policies and locational factors are also essential to embed TNCs and articulate production networks (Yeung and Li 2000; Sit and Liu 2000; Zhou and Tong 2003). Consequently, places and place characteristics have become increasingly important in the location decisions and network configurations of FDI.

Third, while global economic restructuring has made capital more mobile and global in space, overwhelming evidences have shown that FDI in developing countries is concentrated in core city regions, often globalizing city regions. Foreign capital is "sticky" and the extent of diffusion to the periphery is limited. This is because these regions have advantages in labor market conditions, access to domestic and global markets, preferential policy treatment, and infrastructure (Taylor and Thrift 1982; Sit 1993). They are the most globalized places and the focus of FDI in developing countries, as well as emerging nodes of the global economy (Wei and Leung 2005). An emerging global city region is centered on an emerging global city or a primary globalizing city, such as Shanghai. With the functional transformation of global cities towards advanced business services, secondary cities increasingly serve as manufacturing bases of global city regions (Sassen 1991). Together global cities and their secondary cities

form the backbones of national economies, and serve as settings for globalization and the global-local interface (Scott 2001). Given the significance of manufacturing in Asian developing countries, the secondary globalizing cities are playing critical roles in manufacturing and also benefiting from industrial agglomeration in the region. With the opening up of Shanghai's Pudong in the early 1990s, the YRD has become the new action center of FDI in China. It has become an emerging global city region increasingly integrated with the global economy. The Delta, with sixteen municipalities from three provincial units (Shanghai, Jiangsu, and Zhejiang), is considered the dragon's head of China's efforts towards globalization and economic development. In 2005, with a population of 82.12 million, the region attracted US$27.75 billion FDI and produced a GDP of 4,078 billion yuan, accounting for 46 percent and 22.4 percent of China's totals respectively. Such agglomeration and regional networks should have significant effects on FDI location and network decisions in Nanjing.

Last, FDI is grounded in specific sites and can only be realized with proper sites and places. Place-based investment incentives have become the most powerful instrument in the competition for global capital. Besides the tax havens in small countries known globally, governments have created many special economic or export-processing zones located in specific places within cities, with preferential government policies and professional services, as well as better infrastructure and accessibility. Substantial differentials also exist within globalizing cities, where varied zones and districts compete for resources and preferential policies. These zones or districts are also fragmenting the urban spatial structure, where traditional urban centers/districts coexist with new economic spaces created by globalization and spatial restructuring. Grant and Nijman's (2002) study of Accra and Mumbai found the

emergence of multiple centers that are differentially integrated into the wider economy, at local, national, and global scales. Wei and Leung (2005) found that FDI in Shanghai is heavily concentrated in development zones, especially those in Pudong, making them emerging production centers and frontiers of globalization in Shanghai.

This article studies location choices and network configurations of foreign ventures in Nanjing. First, we will examine the significant role of local states in the location and organization of foreign ventures. Second, we attempt to uncover the extent and role of intraurban context in location choice and network relations, and investigate the variations among development zones. We argue that TNCs favor places where they can take advantage of preferential government policies, existing economic bases, and global city headquarter functions (e.g., dense production networks and the access to domestic and international markets). Last, to a lesser extent, we intend to contribute to the research on global city regions by analyzing the location characteristics of Nanjing as part of the YRD, China's largest emerging global city region. We argue that such a location enables Nanjing to better access Shanghai's global city functions and network with cities within the YRD, which makes Nanjing appealing to foreign investment.

**Data and Methodology**

Secondary data of foreign manufacturing ventures comes from two major sources. The first is a statistical document on FIEs compiled by the Nanjing Bureau of Foreign Trade and Economic Cooperation (NBFTEC 2001), which provides information on 1,109 foreign manufacturing plants established between 1987 and 2000 in Nanjing. Since the data are in

text format, we built a database using this volume. This dataset was updated with our second major source from a professional organization of commercial data collection and management working closely with government bureaus. Together we have 1,153 firms for 1987-2000 and 1,288 firms for 1987-2004. These datasets are supposed to cover most of the FIEs and are probably the best data sources on FIEs in Nanjing. Since both datasets are not geo-coded and some did not have detailed addresses, we located the addresses either through the Internet or by calling the firms, and then semi-manually matched the ventures on a digital map of Nanjing. We also checked each location with Nanjing E-Map by using company names and addresses. The study area covers most of the continuously built-up area in the city, including 43 sub-districts and covering an area of 243 $km^2$, where the central city area or urban core of Nanjing is within the old city wall with a denser population (Figure 1). The areas left out in our study are mainly remote suburban rural areas without almost any foreign investment. The whole process of data collection and digitization was labor intensive and extremely time consuming. We believe this represents one of the most detailed studies of the location of FIEs within Chinese cities.

(Figure 1 about here)

Besides drawing from statistics and years of experience with the city, we interviewed a dozen local government officials and twenty foreign firms. In the summers of 2001 and 2002 we interviewed local government officials in Nanjing at all three administrative scales regarding government policies, investment processes, and development issues, including Jiangsu Provincial Planning and Development Commission (currently Jiangsu Development and Reform Commission) and Nanjing Municipal Planning and Development Commission

(currently Nanjing Municipal Development and Reform Commission). At the district/zone level, we interviewed all three national-level development zones: Nanjing ETDZ, Jiangning ETDZ, and Nanjing High-Tech Zone (Figure 1). Most of the interviews lasted one and a half hours. We also held discussions with a dozen local scholars, planners, and consultants regarding globalization, foreign investment, and urban development in Nanjing.

The interviews of foreign firms were conducted mainly in 2002 and 2003, mostly with vice general managers and investment directors, and generally took one to two hours. We used semi-structured questionnaires, which allowed us the opportunity to collect quantitative data and also provided the flexibility to ask open-ended questions about topics such as the investment process and network relations. Most of the questionnaires were filled out during the interview and the rest were picked up a few days later, since more time was often needed to collect the data. Our question design was mainly based on earlier studies on FDI (e.g., Leung 1993) and our experiences with FIEs in China, and was improved through pilot testing. Besides the given choices that are supposed to cover a broad range of possibilities, we also included space for filling in answers that went beyond our expectations (no significant reasoning was reported). The firms were selected from Nanjing and Jiangning ETDZs and the city districts, with a mix of size and source countries to represent FIEs in Nanjing, and were acquired through efforts of cold calling, personal networks, and district/zone administrative offices. A half dozen of these firms, generally the most representative ones, were visited a second time, with further exchanges and questions. We asked for profiles (e.g., the year established, forms of investment, change of investment structure), decisional considerations, and network linkages.

The two secondary datasets and the intensity of interviews with firms and governments provide a complementary mix of quantitative and qualitative data. The quantitative data well represent FIEs in Nanjing and allow us to conduct more rigorous modeling and spatial analysis and present a broad picture of FDI, while the interview provides detailed quantitative and qualitative data, which helped us to understand the investment process, investment environments, and relations with other firms and governments. Together these efforts have generated rich information on policy, FDI, and urban environments in Nanjing.

In terms of analytical methods, which will be explained in more detail in the related sections, we analyze spatial patterns of FIEs through hot spot analysis, mainly the Getis-Ord $G_i^*$ statistic and the average nearest neighborhood (ANN) index, and use regression for location determinants of FIEs.

**FDI in Nanjing: Policies, Processes and Location**

Unlike Western-developed countries without explicit national policies towards FDI (e.g., Phelps and Tewdwr-Jones 2001), China has implemented an open door policy, starting with special economic zones in 1980 and coastal open cities in 1984, and expanding to coastal deltas, selected interior cities, and other cities and counties (Gong 1995; Wei 2000). The opening up of Nanjing in the mid-1980s signaled a gradual increase of FDI, and in 1987, the first national-level development zone, Nanjing Hi-Tech Zone, was established. But like other cities in the YRD, in the mid-1980s FDI in Nanjing was small, with a setback in the late 1980s related to the Tiananmen incident (Table 1).

(Table 1 about here)

In the early 1990s with the intensified efforts in reform and the opening up of Shanghai's Pudong District, the central government provided unprecedented preferential policies to the YRD. Institutions governing FDI have also been decentralized, which has empowered local states to actively initiate open door policies. The State Council approved the establishment of Nanjing ETDZ and Jiangning ETDZ in 1992, with sizable land areas and infrastructure investments (Table 2). The city also established a dozen development zones at the provincial, municipal, and district levels (Romsa and Blenman 1998). Those zones quickly became favored places for foreign investment. FDI in Nanjing increased rapidly from 1993 to 1996, and resurged in the late 1990s after an adjustment period in 1997-98 due to the Asian financial crisis (Table 1). Since the late 1990s, more policies to attract foreign investment have been implemented, including the expansion of development zones, a reward system for official performance in attracting FDI, and improvement of the investment approval process and services. With the infusion of FDI, Nanjing, like other cities in the YRD, has gradually shifted its emphasis towards investment quality and broadened the scope of investment towards services.

(Table 2 about here)

In 2004, Nanjing had actualized FDI of US$256.6 million. Manufacturing has been the largest sector of FDI (65.23 percent in 2004), reflecting the labor-intensive nature of FIEs in China. The amount of FDI in Nanjing, however, has been lower than in Suzhou, another major city in the YRD, where the local government has been aggressively promoting the city to foreign investors by successfully establishing the China-Singapore Suzhou Industrial Park (Pereira 2003). The most important industrial sectors of FDI are textile and clothing,

chemistry, household appliance, and automobile, which in some ways correspond to the industrial structure of Nanjing. FDI in Nanjing is from different sources, mainly Asian countries and regions (e.g., Hong Kong, Taiwan), and developed countries (e.g., U.S., Germany, France, and Italy). Compared with the Pearl River Delta (e.g., Leung 1996; Eng 1997), Nanjing has fewer firms with investment from Japan due to the notorious Nanjing Massacre committed by the Japanese military in 1937.

We found that the sample firms were mainly established after 1992, reflecting the shifting focus of the open door policy from the Pearl River Delta to the YRD and especially the establishment of development zones (Table 3). Our survey indicates that almost no firm was established in the 1980s, which is evidence of the slow start of Nanjing in the opening up process. Twenty percent of the firms were established during 1992-1993, representing the first major wave of FDI in the YRD. Another jump was in 1997, right before the Asian financial crisis. The sample firms were in a variety of sectors, including electronics, electronic machinery, textile and garment, chemical industry, medicine, auto parts, and food processing et al. Joint ventures accounted for 52.6 percent, higher than wholly foreign owned enterprises (WFOEs) (42.1 percent). While recently established FIEs tend to be WFOEs with the maturity of the investment environment and increasing experience of foreign investors, Nanjing still has a relatively higher share of joint ventures in comparison with other cities in the YRD. This reflects Nanjing's status as the provincial capital, with more state investments and industries. JVs are especially prominent in those key sectors of Nanjing dominated by state-owned enterprises, such as automobile and chemical industries, which tend to be capital intensive and oriented towards the Chinese market.

(Table 3 about here)

To reveal the extent of FDI spatial clustering within the city, we calculated the ANN index for each year's spatial distribution of new FDI firms. The ANN index measures the distance between each firm location and its nearest neighbor firm's location, and averages all these as the nearest neighbor distance. By comparing the actual average nearest neighbor distance with a hypothetical random distribution, we can infer if the distributions of firms are clustered or random. An ANN Z-score value of less than -2.58 (significant at 0.01 level) indicates the distribution of FIEs has a clustered pattern, while for significance at the 0.05 level the critical value is -1.96. The smaller the ANN Z-score is, the more clustered the firms are. As shown in Figure 2, the location of new foreign manufacturing ventures began to spread out in the mid-1980s, but the overall pattern became increasingly clustered spatially. In the early 1990s the distribution of FIEs exhibited significantly clustered spatial patterns, due to the establishment of Nanjing ETDZ, Jiangning ETDZ and Nanjing High-Tech Zone, which provided preferential policies hardly matched by areas outside ETDZs. The highest level of clustered distribution occurred in 1993 with an ANN Z-score -15, which indicates a significantly clustered distribution of FIEs in Nanjing, partly due to the wave of FDI infusion after the most intense market reforms.

(Figure 2 about here)

Figure 3 presents the spatial distribution of foreign manufacturing firms in 1990, 1995, 2000 and 2004. The year of 1990 had a very limited number of FIEs. For the other years, we have created a dot density raster layer to reveal the spatial clusters of FIEs. Since the early 1990s, there has been a significant influx of FDI in Nanjing. In 1995, there were three

clusters of FIEs, i.e., the urban core area, Jiangning ETDZ and Nanjing High-Tech Zone. In 2000, there was an increase of firms in Nanjing ETDZ, while the other three clusters remained similar as in 1995. By 2004, we can see that Nanjing ETDZ has become a significant cluster of FIEs. Our interviews suggest that the concentration of FIEs in the urban core area is due to the mature infrastructure, comprehensive transportation facilities, etc., while development zones attracted FDI with more intensive incentives and cheaper land, which will be tested in a later section. The general patterns of FIEs in Nanjing confirm the important roles of development zones in attracting FDI (Wei, Leung, and Luo 2006).

(Figure 3 about here)

Compared with the location of FIEs, FDI in terms of monetary value can better reflect FDI intensity in destination areas. Based on the geo-referenced firm data with registered capital, we use the Getis-Ord $G_i^*$ statistic to identify hot spots of FDI. The G-statistic indicates whether features with high values or features with low values tend to cluster in a study area. If a firm's registered capital is high and registered capital for all of its neighboring firms is also high, it is part of a hot spot. The local sum of registered capital for a firm and its neighbors is compared proportionally to the sum of all firms; a significant Z score indicates a significant difference between local sum and expected value, rather than random distribution. Figure 4 presents the hot spot analysis of registered capital for FIEs in Nanjing in 1990, 1995, 2000 and 2004, and we found that hot spots were identified mainly in the development zones. In 1995, the most significant investment hot spot was in Nanjing ETDZ and its surrounding areas where many heavy industry firms were established, such as petrochemical firms. The significant cluster to the north of the Yangtze River is also a petrochemical firm cluster. When

contrasted with the cluster of FIEs in the urban core area, their distribution in terms of registered capital did not have a high score, i.e., not a hot spot, because most of the manufacturing firms in the urban core area are in light industry, with smaller investments. After 2000, only one hot spot, a food firm, was found in the urban core area. Hot spots began to show up in the south of the city, mainly in Jiangning ETDZ, since 1995, and in 2004 it remained a significant FDI hot spot. FIEs in this area are in various sectors, including food, construction materials and electronics, etc., and mostly in light industry or a high-tech category. Nanjing High-Tech Zone, although it did not attract a large amount of foreign capital, has been a cluster of FIEs since 1995.

(Figure 4 about here)

## Location Decisions and Networks: Survey Findings

### *Decisions to Invest in Nanjing*

The location choice questions include the decision to invest in Nanjing (meso level), and reasons for investing in specific locations within the city (micro level). The sample firms were asked to rank the three most important among a list of eleven factors for choosing to invest in Nanjing, which were assigned scores ranging from three (the highest) to zero (the lowest). As summarized in Table 4, all of the eleven factors are larger than zero, indicating that all locational factors exerted certain influence on the decision to invest in Nanjing.

(Table 4 about here)

The significance of state policy and the institutional environment is well reflected in the decisions to invest in Nanjing and specific zones/districts. Of all the components within the

eleven factors, the provision of better investment incentives is considered the most important. Our survey found that the three most important factors influencing location decision are better investment incentives, proximity to ports, and government attitudes, followed by labor cost, infrastructure and market potential. Nanjing, like other cities in the YRD, has adopted a more streamlined approach (the one-stop service center) for foreign investors, a more transparent policy framework, and a more procedural- (less relationship-) based transaction practice. Our interviews with local officials suggest that Nanjing' position toward FDI is as flexible as many other municipalities in the YRD, but our assessment based on the interview is that Nanjing's open door policies are less transparent and its local government officials are less professional than Suzhou's, which was reflected in the lower amount of FDI in Nanjing.

The least important factors are customer location, Chinese partner location, and material supplies. Our interview also revealed the location advantage of Nanjing as part of the YRD in terms of transportation infrastructure (proximity to ports), market, and industry, and its closeness to Shanghai where some foreign firms' China headquarters are located. But compared to the core cities of the YRD such as Hangzhou and Suzhou, we found through our interview that supply chains with firms in the Delta seem less significant in Nanjing, which points to the fact of Nanjing's peripheral location in the YRD.

***Intraurban Location Decisions***

FDI is unevenly distributed within Nanjing, as shown in our data on FIEs (Figures 2 & 3). As found in the above section, most of the FIEs are located in the core city area and the three ETDZs. National-level Nanjing and Jiangning ETDZs lead the manufacturing firms, while

the service firms are more heavily concentrated in the city district and high-tech zone, reflecting the nature of ETDZs, land availability, and the need for service firms to locate closer to commercial activities, based on our interviews with FIEs and local governments. Location of FDI also varies with industrial sectors. Our fieldwork and analysis of firm data suggest that construction material firms are heavily concentrated in Jiangning ETDZ, reflecting the advantage of natural resources.

Our interview shows the following as the most important factors: better investment incentives, better zone/district government attitudes, better industrial infrastructure, and government efficiency, followed by land cost and transportation infrastructure (Table 4). Once again, local state institutions are considered the most important factor in location decisions. First, foreign investors, in determining intraurban location, consider better investment incentives as the most important factor, with better zone/district government attitudes ranked next. We found that TNCs' location decisions are heavily influenced by government policies and services. National development zones have advantages in providing preferential policies and better services, and the higher the rank of development zone, the better they will be. The better soft and hard investment environments of development zones make them attractive to FDI, which is behind the competition for establishing development zones. In this sense, China's policy of development zones is effective in attracting FDI.

Second, better industrial infrastructure can save production costs and improve efficiency; land and transportation costs are important to foreign investors, and input costs do vary within the city. Shortage of land for development is a common problem facing FIEs. We found that specific location is an important factor for foreign investors in deciding whether

and where to invest. FIEs, especially small and medium-sized ventures, tend to weigh more heavily on input costs, which are influenced by government policy, industrial infrastructure, and land development et al. This also reflects the effects of spatial agglomeration, as noticed by other scholars (e.g., Wei and Leung 2005; He, Wei, and Xie 2008).

Last, each of the national-level development zones has its own competitive advantages in certain areas. Jiangning ETDZ has more available land for foreign investment, while Nanjing ETDZ is closer to the Yangtze River and the Nanjing Port. Moreover, local/district governments can also provide local policies, customized services and special attention, and therefore the effectiveness of development zones in attracting FDI varies across space; not all firms are located in national development zones.

***Network Configurations and State-Firm Relations***

Like other secondary cities in the YRD such as Suzhou and Hangzhou, most of the surveyed foreign firms in Nanjing serve as production sites for the Chinese and global markets. Among the total functions reported from the surveyed firms, FIEs overwhelmingly serve as production facilities for either the Chinese market (24 percent) or the world market (40 percent) (Table 5). Twelve percent of functions in the surveyed firms serve as marketing facilities mainly for the Chinese market. Three firms had functions as product development facilities for the Chinese market, while another three firms reportedly served as product development facilities for the world market. None of the firms provided basic R&D functions. Foreign firms in Nanjing therefore mainly serve as production sites, part of the well-known story of "made in China." The significance of the Chinese

market, however, has been rising over time.

An excellent case with more advanced functions is A.O. Smith, where we were given extensive interviews and a tour of the factory with the CEO, who was educated and trained in U.S. and maintains close ties with its headquarters. To satisfy the need of the Chinese market where heaters have to be placed in living rooms, their products have to be smaller in size, more appealing, and provide more choices for consumers, which is quite different from the North American market where heaters are often placed in basements. This firm therefore has to build up product development facilities for the Chinese market, and marketing forces are also needed to penetrate the Chinese market. Those functions serving the Chinese market have been gradually decentralized to the Nanjing firm. Increasingly the firm's development facilities are being used for the world market as well, although basic R&D is still located in its headquarters.

(Table 5 about here)

External relations with firms in China show the significance of relations with firms in the YRD. Most of the firms had materials and standard components purchased from China. Regarding local supply areas, the firms provided supply data indicating that in general 40-60 percent of their supplies come from the YRD. These findings suggest the significance of the YRD and the improving product quality of firms in China, although many of them are FIEs. For marketing relations, the YRD is often considered the most important market as well, where sales could account for 30-50 percent, followed by Guangdong and northern China. This suggests the significance of the three emerging global city regions as China's major market areas. Most of the firms interviewed also consider their overall sales relationship with

customer firms in China good or very good.

Our fieldwork suggests that production localization is favored by FIEs, which can help them reduce production costs and adapt to the institutional and cultural environments of China. The level of localization has also been increasing somewhat over time, and FIEs are more localized and embedded than a decade ago, showing an improvement over Yeung and Li's (2000) observation that the level of localization was low in China. In fact, most of the raw materials and external production are contracted with firms in China, especially those in Nanjing or the YRD, making FIEs more embedded in local/regional economies. The embeddedness is mainly due to the relatively interior location of Nanjing and the rapidly growing Chinese market and high-quality producers, which make FIEs voluntarily seek localization (volunteer embeddedness). Such a trend is even more obvious in the Japanese firms we interviewed. Local content requirement of the government is almost none for the firms we surveyed, but such policies exist in strategic sectors such as the automobile and petrochemical industries. This indicates that obligated embeddedness of auto-producing FDI in Shanghai (Sit and Liu 2000), which had strong local content requirements, is sector specific. However, local embeddedness is selective, and we find that supply relations tend to be formed with other FIEs. The Nanjing case in general confirms the observation that foreign investors appear to share their own 'glocal' networks (Jensen 2004). This raises concern over the trickle down or spillover effects of FIEs on local economies, a concern shared by many other developing and transition countries (e.g., Taylor and Thrift 1982; Hardy 1998; Phelps and Tewdwr-Jones 2001), as well as in China (Yeung and Li 2000; Yang 2007).

The nature of linkages also varies within specific locations in the city. National zones

enjoy most favorable FDI policy, well-developed infrastructure, and more transparent and professional government services (Wei and Leung 2005). For firms located in national ETDZs, first, the linkages tend to be broad in scale, since those zones are "Greenfield" development often without local firms to network with. Second, spatial agglomeration is reflected in the access to government policies and better services provided by zone administrative commissions and better infrastructure. Third, FIEs also communicate among themselves to form social organizations for informal exchange. This is because national development zones are often located in suburban areas, with highly concentrated foreign firms and weak local firms and linkages. Such a spatial mismatch forms the basis for weak local embeddedness, which is intertwined with technological (gaps between FIEs and indigenous firms) and institutional (preference of ETDZs for FIEs) mismatches.

In terms of firm-state relations, we find that the Chinese state still exerts a tremendous influence over the establishment and operation of FIEs. Most firms reported a close relationship with the local government during the project approval and construction process. Once in operation, FIEs still keep close ties with local governments, due to state control of tax, customs, labor, and environmental regulations, and various state subsidies. While many firms report positive state-firm relationships, some want local governments to further improve the investment environment, especially simplifying and clarifying FDI policies, strengthening law implementation, and reducing corruption. We found though our interviews that such a demand is stronger in Nanjing than Suzhou, reflecting the greater interior location and more conservative institutional environment of the city (Luo and Wei 2006).

**Location Determinants: Findings from Regression Analysis**

In this section we further the above analysis by exploring the location determinants for FIEs at the sub-district level (64 units) for the year of 2000 using regression analysis. Location-specific advantages are crucial factors of FDI and international production (Dunning 2001). These factors have been studied mainly at macro and meso-scales in China (e.g., Cheng and Kwan 2000; Zhang 2000; Ng and Tuan 2003; Blonigen 2005; Gao 2005; He 2006). We consider two indicators of FDI as dependent variables: contracted investment and the number of employees of FDI plants. We analyze in more detail the model based on investment since that is the focus of our study. For location determinants at the intraurban level, several types of independent variables that represent physical and socio-economic conditions of sub-districts are taken into account, based on our study of China and review of the literature (Table 6). As outlined in the research background section, our analytical framework highlights the significance of institutions, place characteristics, and agglomeration in the location decisions of FDI. Given the intraurban scale of analysis, determinants at the national (e.g., NAFTA, political risk) or regional (e.g., labor cost, market size, union membership) scales do not apply, which points out the need for this scale of analysis and leaves us with variables more strongly tied to place characteristics.

(Table 6 about here)

Government policy: Research on the effect of government policy on the location of FDI has offered conflicting findings. As the existing literature on China (Zhang 1994; Ma 2002; Wint and Williams 2002; Qiu 2005; Yu and Wei 2008) and our survey found, government policy plays a critical role in foreign investment and regional development. At the intraurban

scale, the most significant government policy in China is the establishment of ETDZs. Such investment zone-based policies tend to have a positive effect on the infusion and location of FDI (Globerman and Shapiro 1999). There are two kinds of ETDZs in Nanjing: national ETDZs, covering five sub-districts in this research, and local ETDZs (often named as Technological Parks, Industrial Parks or Economic Development Areas), covering 23 sub-districts in this research. These two kinds of ETDZs have different administrative and tax policies. Compared to local ETDZs, national ETDZs have much more administrative power, more favorable tax policies, and better financial and labor administration services. National and local ETDZs existing in subdistricts are represented by two categorical variables.

Accessibility: Accessibility is another significant attraction for FDI in the Western and Chinese contexts (Glickman and Woodward 1988; Hill and Munday 1992; Gong 1995; Wu 1999; Wu and Radbone 2005; Berköz and Eyuboglu 2007), which in our study represents conventional locational factors of urban infrastructure and transportation, as well as access to Shanghai, an emerging global city. Studies of international trade and world city systems revealed that accessibilities to airport and highway are the two most important factors (Knox and Taylor 1995; Guimera et al. 2005), which are the focus of existing research on FDI (e.g. Wu 1999). On the other hand, traditional studies of industrial location also indicate the significance of accessibility to the central business district (CBD) and transportation infrastructure. Hence, in this research, five variables are included to indicate accessibility of a subdistrict: distances to the CBD, port, airport, highways and railway station. They are calculated in the GIS environment by measuring the Euclidean distance between a sub-district centroid to the CBD, port, airport, the nearest highway and the nearest railway

station respectively.

Urban Spatial Structure: Generally, research on the effects of urban spatial structure on the location of FDI is very limited. Consistent with industrial location theory, existing research found that urban spatial structure plays an important role in FDI location choice (Berköz and Eyuboglu 2007; Wu and Radbone 2005). According to the Nanjing Bureau of Planning, subdistricts are classified into three types: central city, near suburb and remote suburb (Luo and Wei 2006). Institutionally, suburbs have more flexible administrative and financial systems and therefore might be able to provide more flexible institutional arrangements and financial support for FDI. We use two categorical variables to represent if a subdistrict is in the central city, near suburb, or remote suburb. There are two states for each variable; zero means the subdistrict is not in a near suburb or a remote suburb and vice versa for value one, and if both of the two variables have a value of zero it means the subdistrict is in the central city area. This type of variable represents the urban spatial structure of Nanjing, as well as the institutional arrangement.

Yangtze River: The influence of physical geographical factors on industrial location choice cannot be ignored. The importance of physical geographical factors has been re-emphasized in the studies of new economic geography (e.g., Rappaport and Sachs 2003). In this research, it is commonly accepted that physical features such as rivers can act as natural barriers to block the flow of FDI across space. Our analysis of FDI distribution in Nanjing also indicates differentials between the northern and southern parts of the Yangtze River, and this categorical variable shows such locations of subdistricts. Value one indicates the subdistrict is in the northern part of the Yangtze River, while zero indicates location in the

southern part.

Population and land: Population and available land are also often used in studies of location decisions in economic geography, and sometimes are regarded as control variables. Regions with more population or available land for development are expected to attract more foreign investment because of market potentiality, labor supply and cost reduction (Wu 1999). We also expect that subdistricts with more industrial land have better industrial infrastructure and tend to attract more FDI, as our survey found. In this research, the data of population comes from the Fifth National Census in 2000.

The results of the regression analysis are shown in Table 6. The regression models are significant at the level of 0.01 and the R squares are high (0.702 and 0.712), indicating that the determinant factors well explain the FDI distribution at the subdistrict level. First, national ETDZ is the most important factor for location decisions, especially for investment projects that require large numbers of employees, which is consistent with our previous analysis of FDI distribution and location decisions, implying the significance of government policies. Local ETDZs in Nanjing tend to be small and have little effect on the location decisions of FDI. Subdistricts with national ETDZs therefore have great advantages in attracting big ventures with huge investment and employment.

Second, accessibility indicators have varied effects on the location of FDI. Distance to ports is a significant variable in location choices, which confirms our survey and supports the importance of ports to FIEs in Nanjing, connecting Nanjing with Shanghai and the international marketplaces. Distance to the railway station is not significant with employment, but is a significant negative factor for investment, which is understandable since the railway

station in Nanjing is located in the city district, and used mainly for residential and commercial activities. When we ran the model with employment as the dependent variable, we found that distance to the airport is a significant variable. This is logical given the importance of airports to FIEs with large numbers of workers. Other variables are insignificant, which is also in general consistent with our survey. Because of improvements in local transportation infrastructure, the highway is not a major consideration for location decisions. Foreign manufacturing ventures in Nanjing tend to locate in ETDZs, and often have little to do with the CBD of the city.

Third, land use variables have an important influence on FDI location choice. Availability of industrial land is a significant factor for investment, which is consistent with our survey that industrial infrastructure is a critical consideration for FDI location choice. Available land is marginally significant for the model, implying that subdistricts with more available land for development tend to have more FDI. This suggests that for projects with large amounts of investment, it is not simply available land but available industrial land that plays an important role in location decisions. For plants with large employment, land size matters more. These findings provide more detailed information and suggest that we have to be more careful with the role of available land in location decisions. Population is not a significant variable in the location of FDI, because many of the workers are not drawn locally and manufacturing floor workers tend to be migrants.

Last, location of either central city, near suburb or remote suburb is not a significant determining factor. This is because all districts in Nanjing have attempted to attract FDI. The location of ETDZs overrides the urban spatial structure or the city-suburb's institutional

arrangement in determining the location of FDI. The Yangtze River is a negative factor in location decisions, but insignificant.

Our regression analysis has therefore identified state policy, industrial land, and the traditional locational accessibility factor of ports as the most significant variables in the location choices of FDI. This is in general consistent with our interviews. These findings indicate the significance of state institutions, agglomeration, and accessibility in the location decisions of FDI. Our quantitative and qualitative methods have generated similar findings, another indication of the reliability of our field interviews and regression models. Such a mixed-method approach clearly has advantages over the quantitative and qualitative divide.

## Conclusion

This article has analyzed locational factors and network relations of FIEs in Nanjing. First, our research shows the significance of government policy in location decisions, which confirms the important role of state institutions in location choice and economic development. We have found that the state is the most important factor for choosing investment in Nanjing. Our study of locational decisions further found that substantial differentials also exist among districts within the city. Investment policies are key determining factors of micro-level location decision making as well. This finding once again suggests the significance of government incentives in the infusion of FDI, which we believe is a fundamental reason for the rise of China in competition for global capital. We are, however, concerned with the opportunity cost of such incentives, especially the loss of suburban land to extensive, inefficient industrial use. The advantages of development zones in attracting foreign

investment have led to "zone fever" in China.

Second, Nanjing has also benefited from transportation and access to the YRD, as well as industrial infrastructure. This indicates the competitive advantages of national-level development zones and the location of the YRD as an emerging global city region in attracting FDI. FDI in Nanjing is closely related to the city's location as a subcenter of the YRD. While national development zones have been established in interior China as well, the interior cities can never match coastal cities in terms of government services, as well as location and infrastructure. These differentials contribute greatly to the stickiness of foreign investment in the core city regions of developing countries, which is a manifestation of "geography matters," quite significantly, despite globalization. This finding supports spatial concentration of FDI in the core areas of developing countries and locational stickiness. This further confirms the importance of global city regions in global capital flow and spatial restructuring, a notion faithfully argued by geographers (e.g., Scott 2001) but without much supporting empirical work.

Last, globalization and regionalization are two sides of same token, and foreign firms are becoming more embedded in China. Many FIEs in China have increasing control over raw materials, external production, marketing functions, and product development functions, in relation to parent firms. The significance of the Chinese market and the emergence of local suppliers have made FIEs choose localization and embeddedness as firm strategies. The localization of production proves positive effects since such linkages help external producers improve production and management. However, production networks are mainly among FIEs, and the extent of localization and basic R&D are largely determined by the parent firms based

in developed countries. The extent of local embeddedness also varies with places, and tends to be lower in places with weak local endogenous production capacities. International experiences prove that basic research is always under the control of parent firms (Allen and Thompson 1997), and we believe the direct involvement of TNCs in basic research in China will be limited in the near future and uncertain in the long term. This has drawn the attention of the Chinese government, with which foreign firms must maintain good relationships, as it provides policy and other incentives for foreign investors. The government has been using the "carrot and stick" strategy to enhance local embeddedness and R&D capacities, but the result is yet to be seen in the short term.

China is a dynamic and diverse country, and is the largest recipient of FDI in the world, yet the research on FDI in China remains limited. Intraurban location of FIEs is a potentially fruitful study area. We believe the intraurban scale is the cornerstone essential to a better understanding of FDI. Many questions require further study, such as how the investment process and locational factors differ at urban, regional and national scales, in terms of decision makers, time, importance, and reasoning, etc. The lack of publicly accessible geographical data bases such as TIGER in the U.S. has constrained the efforts to better understand the whole picture of firm behaviors and urban structure at the micro scale. While there is a substantial literature on embeddedness, theoretically informed empirical studies on China remain limited. More research on different cities of China is also needed to further understand the geographical differentials in location, networks and embeddedness of FIEs.

**Literature Cited**

Allen, J. and G. Thompson. 1997. Think global, then think again. *Area* 29(3): 213-27.

Blonigen, B.A. 2005. A review of the empirical literature on FDI determinants. *Atlantic Economic Journal* 33(4): 383-403.

Berköz, L. and E. Eyuboglu. 2007. Intrametropolitan location of producer-service FDI in Istanbul. *European Planning Studies* 15(3): 357-81.

Cheng, L.K. and Y.K. Kwan. 2000. What are the determinants of the location of foreign direct investment? The Chinese experience. *Journal of International Economics* 51(2): 379-400.

Cooke, P., A. Price, and K. Morgan. 1995. Regulating regional economies. In M. Rhodes (ed.) *The Regions in the New Europe*, pp. 105-135. Manchester: Manchester University Press.

Dunning, H., A. Williams, S. Abonyi and V. Crooks. 2008. A mixed method approach to quality of life research. *Soc Indic Res* 85(1): 145–58.

Dunning, J.H. 2001. The eclectic (OLI) paradigm of international production. *International Journal of the Economics of Business* 8(2):173-90.

Eng, I. 1997. The rise of manufacturing towns: externally driven industrialization and urban development in the Pearl River Delta of China. *International Journal of Urban and Regional Research* 21(4): 554-68.

Friedman, J., A.G. Daniel and S. Jonathan. 1992. What attracts foreign multinational corporations? Evidence from branch plant location in the United States. *Journal of Regional Science* 32: 403-18.

Gao, T. 2005. Labor quality and the location of foreign direct investment: Evidence from

China. *China Economic Review* 16(3):274-92.

Glickman, N. and D. Woodward. 1988. The location of FDI in the US. *International Regional Science Review* 11(2): 137-54.

Globerman, S. and Daniel M Shapiro. 1999. The impact of government policies on foreign direct investment: The Canadian experience. *Journal of International Business Studies* 30(3): 513-32.

Gong, H.M. 1995. Spatial patterns of foreign investment in China's cities, 1980-1989. *Urban Geography* 16(3): 198-209.

Grant, R. and J. Nijman. 2002. Globalization and the corporate geography of cities in the less-developed world. *Annals of the Association of American Geographers* 92(2): 320-40.

Guimera, R., S. Mossa, A. Turtschi, and L.A.N. Amaral. 2005. The worldwide air transportation network. *Proc. Natl. Acad. Sci. U. S. A.* 102(22): 7794-99

Hardy, J. 1998. Cathedrals in the desert? Transnationals, corporate strategy and locality in Wroclaw. *Regional Studies* 32: 639-52.

He, C.F. 2006. Regional decentralisation and location of foreign direct investment in China. *Post-Communist Economies* 18(1): 33-50.

He, C.F., Y.H.D. Wei and X.Z. Xie. 2008. Globalization, institutional change, and industrial location: Economic transition and industrial concentration in China. *Regional Studies* 42(7): 923-45.

Hill, S. and M. Munday. 1992. The UK regional distribution of foreign direct investment. *Regional Studies* 26(6): 535-44.

Hill, H. and P. Athukorala. 1998. Foreign direct investment in East Asia: A survey. *Asian-Pacific Economic Literature* 12(2): 23-50.

Howell, J. 1993. *China Opens its Doors*. Boulder, CO.: Lynne Rienner.

Hsing, Y. 1998. *Making Capitalism in China*. New York: Oxford University Press.

Jensen, C. 2004. Localized spillovers in the Polish food industry. *Regional Studies* 38(5): 535–50.

Knox, P.L. and P.J. Taylor. 1995. *World Cities in a World-System.* London: Cambridge University.

Leung, C.K. 1993. Personal contacts, subcontracting linkages, and development in the Hong Kong-Zhujiang Delta region. *Annals of the Association of American Geographers* 83(2): 272-302.

Leung, C.K. 1996. Foreign manufacturing investment and regional industrial growth in Guangdong Province, China. *Environment and Planning A* 28(3): 513-36.

Loree, D. and S. Guisinger. 1995. Policy and non-policy determinants of US equity foreign direct investment. *Journal of International Business Studies* 26: 281-99.

Luo, J. and Y.H.D. Wei. 2006. Population distribution and spatial structure in transitional Chinese cities: A study of Nanjing. *Eurasian Geography and Economics* 47(5): 585-603.

Ma, L.J.C. 2002. Urban transformation in China, 1949-2000. *Environment and Planning A* 34(9): 1545-69.

Moran, T.H. 2002. *Beyond Sweatshops: Foreign Direct Investment and Globalization in Developing Countries*. Washington, D.C.: Brookings Institutions Press.

NBFTEC (Nanjing Bureau of Foreign Trade and Economic Cooperation). 2001. *Compilation*

*of Foreign Invested Enterprises in Nanjing*. Nanjing: NBFTEC.

Ng, L.F.Y., and C. Tuan. 2003. Location decisions of manufacturing FDI in China: Implications of China's WTO accession. *Journal of Asian Economics* 14(1):51-72.

NSB (Nanjing Statistical Bureau). 2006. *Nanjing Statistical Yearbook*. Beijing: China Statistics Press.

Pereira, A.A. 2003. *State Collaboration and Development Strategies in China*. London: Routledge.

Qiu, Y. 2005. Personal networks, institutional involvement, and foreign direct investment flows into China's interior. *Eonomic Geography* 81(3): 261-281.

Qu, T. and M.B. Green. 1997. *Chinese Foreign Direct Investment.* Brookfield, Vermont: Ashgate.

Phelps, N.A. and M. Tewdwr-Jones. 2001. Globalisation, regions, and the state: exploring the limitations of economic modernization through inward investment. *Urban Studies* 38(8): 1253-72.

Phelps, N.A., D. Mackinnon, I. Stone, and P. Braidford. 2003. Embedding the multinationals? Institutions and the development of Overseas Manufacturing Affiliates in Wales and North East England. *Regional Studies* 37(1): 27-40.

Rappaport, J. and J.D. Sachs. 2003. The United States as a coastal nation. *Journal of Economic Growth* 8(1): 5-46.

Romsa, G. and M. Blenman. 1998. Foreign investment along the Lower Yangzi: Nanjing 1988-1993. *Environment and Planning A* 30(9): 1625-42.

Sassen, S. 1991. *The Global City: New York, London, Tokyo*. Princeton, NJ, Princeton

University Press.

Scott, A.J. (ed.) 2001. *Global City-Regions*. New York: Oxford University Press.

Sit, V.F.S. 1993. Transnational capital flows, foreign investments and urban growth in developing countries. In J.D. Kasarda and A.M. Parnell (eds.), *Third World Cities*. Newbury Park: Sage Publications.

Sit, V.F.S. and W.D. Liu. 2000. Restructuring and spatial change of China's auto industry under reform and globalization. *Annals of the Association of American Geographers* 90(4): 653-73.

Taylor, J. 1993. An analysis of the factors determining the geographical distribution of Japanese manufacturing investment in the UK, 1984-91. *Urban Studies* 30(7): 1209-24.

Taylor, M. and N. Thrift (eds.). 1982. *The Geography of Multinationals*. London: Croom Helm.

UNCTD (United Nations Conference on Trade and Development). 2004. *World Investment Report 2004*. New York: United Nations.

Urata, S. and H. Kawai. 2000. The determinants of the location of foreign direct investment by Japanese Small and Medium-sized Enterprises. *Small Business Economics* 15: 79-103.

Wei, Y.H.D. 2000. *Regional Development in China*. New York: Routledge.

Wei, Y.H.D. 2007. Regional development in China: Transitional institutions, embedded globalization, and hybrid economies. *Eurasian Geography and Economics* 48(1): 16-36.

Wei, Y.H.D. and C.K. Leung. 2005. Development zones, foreign investment, and global-city formation in Shanghai. *Growth and changes* 36(1): 16-40.

Wei, Y.H.D., W.M. Li, C.K. Leung and R. Pan. 2008. Institutions, location, and network of

multinational enterprises in China: A case study of Hangzhou. *Urban Geography* 29(7): 639-61.

Wei, Y.H.D., C.K. Leung, J. Luo. 2006. Globalizing Shanghai: foreign investment and urban restructuring. *Habitat Internal* 30(2): 231-44.

Wint, A.G., and D.A. Williams. 2002. Attracting FDI to developing countries: A changing role for government? *International Journal of Public Sector Management* 15 (4-5): 361-374.

Wu, F.L. 1999. Intrametropolitan FDI firm location in Guangzhou, China: A Poisson and negative binomial analysis. *Annals of Regional Science* 33(4): 535-55.

Wu, J. and I. Radbone. 2005. Global integration and the intra-urban determinants of foreign direct investment in Shanghai. *Cities* 22(4): 275-86.

Yang, C. 2007. Divergent hybrid capitalisms in China: Hong Kong and Taiwanese electronics clusters in Dongguan. *Economic Geography* 83(4): 395-420.

Yeung, H. W. 2003. Practicing new economic geographies: A methodological examination. *Annals of the Association of American Geographers* 93(2): 442-62.

Yeung, Y. and X. Li. 2000. Transnational corporations and local embeddedness: company case studies from Shanghai. *Professional Geographer* 52(4): 624-35.

Yu, D.L. and Y.H.D. Wei. 2008. Spatial data analysis of regional development in Greater Beijing, China, in a GIS environment. *Papers in Regional Science* 87(1): 97-117.

Yusuf, S. and W.P. Wu. 2002. Pathways to a world city: Shanghai rising in an era of globalization. *Urban Studies* 39(7): 1213-40.

Zhang, L.Y. 1994. Location-specific advantages and manufacturing direct foreign investment

in south China. *World Development* 22(1): 45-53.

Zhang, X. 2000. Motivations, objectives, locations and partner selections of foreign invested enterprises in China. *Journal of the Asia Pacific Economy* 5 (3): 190-203.

Zhou, Y. and X. Tong. 2003. Interaction between multinational corporations and domestic firms in a high-tech service cluster in Beijing. *Economic Geography* 79 (2): 129-52.

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***Table 1*** *Nanjing: Major Indicators of Development and FDI, 1980-2004*

| | Population (Million) | GDP (Billion Yuan) | GDP Per Capita (Yuan) | Foreign Capital (US$ Million) | Export (US$ Million) |
|---|---|---|---|---|---|
| 1980 | 3,612 | 4.3 | 1190 | N/A | 233 |
| 1985 | 4,658 | 8.1 | 1739 | N/A | 207.14 |
| 1990 | 5,018 | 16.9 | 3206 | 374.9 | 312.13 |
| 1995 | 5,217 | 57.65 | 10,887 | 415.31 | 798.24 |
| 2000 | 5,449 | 102.13 | 18,546 | 986.93 | 1,786.24 |
| 2004 | 5,836 | 206.7 | 35,769 | 2,566.36 | 10,459.74 |

Source: Statistical Yearbook of Nanjing (varied years).


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**Figure Captions**

Figure 1. Location and Spatial Organization of Nanjing City

Figure 2. Changing Level of Spatial Clustering of Foreign Ventures in Nanjing, 1985-2004.

Figure 3. Location Sites of Foreign Ventures in Nanjing

Figure 4. Hot-Spot Analysis of Registered Capital of Foreign Ventures in Nanjing.



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***Table 2*** *National-Level Development Zones in Nanjing, 2005*

| | Nanjing ETDZ | Jiangning ETDZ | Nanjing High-Tech Zone |
|---|---|---|---|
| Year Opened | 1992 | 1992 | 1988 |
| Planned Area (sq. km) | 13.37 | 70 | 16.5 |
| Developed Area (sq. km) | 30 | 25 | 10 |
| Infrastructure Investment (million yuan) | 2,000 | 1,600 | N/A |
| # of Foreign-Invested Enterprises (FIEs) | 400 | 1,800 | N/A |
| Accumulative Total Investment (US$ million) | 6,000 | 8,500 | N/A |
| Accumulative Foreign Investment (US$ million) | 1,700 | 2,300 | 4,780 |
| Industrial Output (billion yuan) | 104.7 | 64.7 | 151.9 |
| GDP (billion yuan) | 11.6 | 17.8 | 15.9 |
| Export (million USD) | 3,300 | 1,770 | 7,188 |

Source: The websites of Nanjing ETDZ, Jiangning ETDZ, and Nanjing High-Tech Zone


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***Table 3*** *Profile of Surveyed Firms*

| Attribute | Category | Number of Cases | Percent |
|---|---|---|---|
| Year Established | Before 1992 | 1 | 5 |
| | 1992-1995 | 7 | 35 |
| | 1996-1999 | 9 | 45 |
| | >= 2000 | 3 | 15 |
| | Total | 20 | 100 |
| Types | Joint Ventures | 10 | 52.6 |
| | WFOEs | 8 | 42.1 |
| | Joint Management | 1 | 5.3 |
| | Total | 19 | 100 |
| Investment (US$ million) | <1 | 1 | 5.8 |
| | 1-10 | 8 | 47.1 |
| | >10 | 8 | 47.1 |
| | Total | 17 | 100 |
| Country Source | Japan | 2 | 16.7 |
| | United States | 5 | 41.7 |
| | Hong Kong | 2 | 16.7 |
| | Taiwan | 3 | 25 |
| | Total | 12 | 100 |
| # of Employees | <100 | 1 | 5.3 |
| | 100-199 | 4 | 21.1 |
| | 200-500 | 7 | 36.8 |
| | >500 | 7 | 36.8 |
| | Total | 19 | 100 |

Source: The survey.

Note: (1) The difference in the total number of cases between categories is due to non-responses; (2) Officially there are five forms of FDI in China: equity joint ventures (EJVs), cooperative operation enterprises or contractual joint ventures (CJVs), wholly foreign-owned enterprises (WFOEs), sharing-holding enterprises (SHEs) and joint exploration (JE).


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***Table 4*** *Investment Decisions in Nanjing*

| Interurban Location | Summary Scores | Intraurban Location | Summary Scores |
|---|---|---|---|
| Investment Incentives | 117 | Investment Incentives | 127 |
| Close to Ports | 88 | Government Attitude | 93 |
| Government Attitude | 83 | Industrial Infrastructure | 79 |
| Labor Cost | 70 | Government Efficiency | 67 |
| Infrastructure | 68 | Close to Ports | 60 |
| Market Potential | 57 | Land Cost | 60 |
| Skilled Workers | 55 | Close to Customers | 34 |
| Urban Amenities | 40 | Close to Downtown | 27 |
| Material Supplies | 23 | Available Land | 19 |
| Chinese Partner Location | 19 | Government Advice | 18 |
| Customer Location | 17 | Chinese Partner Location | 17 |

Source: The survey. Scores are based on the ranking of locational factors.


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***Table 5*** *Functions of Foreign Ventures in Nanjing*

| Venture Functions | Summary |
|---|---|
| Regional headquarters for China | 0 (0%) |
| Regional headquarters for Asia-Pacific | 0 (0%) |
| Production facility mainly for China market | 6 (24%) |
| Production facility mainly for world market | 10 (40%) |
| Marketing facility mainly for China Market | 3 (12%) |
| Product development facility for China market | 3 (12%) |
| Product development facility for world market | 3 (12%) |
| Process development facility for China market | 0 (0%) |
| Basic R&D facility for world market | 0 (0%) |
| Total | 25 (100%) |

Source: The survey.


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*Table 6* *Regressions for Location Determinants of Foreign Ventures*

| Variables | Model 1*** (Contracted Investment) | | Model 2*** (Number of Employees) | |
|---|---|---|---|---|
| | Coef. | Beta | Coef. | Beta |
| Pop. Density | -0.08 | -0.117 | -0.02 | -0.093 |
| Available land | 100.87* | 0.183 | 62.27** | 0.290 |
| Industrial land | 995.13** | 0.340 | 256.77 | 0.226 |
| Distance | | | | |
| To CBD | -255.64 | -0.183 | -94.87 | -0.175 |
| To highway | 900.58 | 0.220 | 397.62 | 0.250 |
| To railway station | 1,047.28** | 0.474 | 286.67 | 0.334 |
| To airport | -765.08 | -0.648 | -356.08 ** | -0.776 |
| To port | -1,065.83 *** | -0.599 | -377.89 *** | -0.547 |
| ETDZ | | | | |
| Local ETDZ | 1,330.01 | 0.063 | -16.65 | 0.002 |
| National ETDZ | 16,298.17 *** | 0.468 | 5251.16 ** | 0.388 |
| Suburb/Central city | | | | |
| Near suburb | -6,116.22 | -0.162 | -1,200.13 | -0.082 |
| Remote suburb | 1,144.96 | 0.051 | 3,722.09 | 0.424 |
| N or S of Yangtze River | -1,230.28 | -0.051 | -1,782.53 | -0.192 |
| Constant | 40,410.18 | | 17,404.04 | |
| $R^2$ | 0.702 | | 0.712 | |
| Adjust $R^2$ | 0.624 | | 0.637 | |
| F-score | 9.040 | | 9.521 | |

Note: N=64. *p<0.1, **p<0.05, ***p<0.01.


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